surface between the crystal **21** and the crystal **22** is symmetric with respect to the direction of travel of light and, by an extraneous electric field E_z being applied in the direction of the z-axis, it exhibits a lens action convergent relative to the polarized light **14** polarized in the direction of the x'-axis of the crystal **21**. The focal length f of the lens is varied by varying the voltage V by the variable power source **16**. Also, a divergent concave lens is obtainable by reversing the structures of the crystal **21** and the crystal **22**, that is, by setting the x'-axis of the crystal **22** and the y'-axis of the crystal **21** perpendicularly to the optical axis. In the present embodiment, no transparent electrode exists in the path of light, and this results in greater brightness of the lens than that of the lens according to the first embodiment.

A third embodiment of the present invention will now be described. In this embodiment, the KH_2PO_4 crystal **11** in the embodiment of FIG. 2 is replaced by another crystal having no electrooptic effect or an amorphous substance such as glass. That is, according to the present embodiment, a variable-focal-length lens is constituted by a compound lens comprising a lens formed of electrooptic crystal and a lens formed of another crystal or an amorphous substance or the like, means for applying an electric field of uniform intensity distribution to the lens formed of electrooptic crystal, and means for varying the intensity of the electric field to be applied to thereby vary the focal length of the compound lens.

In the present embodiment, when the index of refraction of said other crystal or said amorphous substance is n_{31}, the value of n_{31} can be selected freely. That is, a convex lens can be realized by using $n_{31} < n_{12}$ relative to the index of refraciton n_{12} of the crystal **12**, and a concave lens can be realized by using $n_{31} > n_{12}$ and, as in the first embodiment, by controlling the electric field E_z to be applied, the value of n_{12} is varied in accordance with equation (7) and the focal length of the compound lens is varied. Also, by setting the value of n_{31} within the range of values which n_{12} assumes depending on the extraneous electric field E_z, there can be obtained a variable-focal-length lens in which not only the focal length but also the positive and the negative of the lens power can be changed over in accordance with the variation in intensity of the electric field.

Again in the present embodiment, as in the first embodiment, by the means for varying the polarization direction of the light beam passing through the compound lens being disposed on the light path, there can be obtained a variable-focal-length lens having a wider range of variation of the focal length, including the change-over of the positive and the negative of the lens power.

While the third embodiment has been described as an example in which the KH_2PO_4 crystal **11** of the first embodiment is replaced by another crystal or an amorphous substance, a similar variable-focal-length lens can also be obtained by replacing the crystal **12** by another crystal or an amorphous substance or by replacing either the crystal **21** or the crystal **22** in the second embodiment by another crystal or an amorphous substance. That is, in the present invention, if at least one lens comprising electrooptic crystal is included in the compound lens, a variable-focal-length lens can be realized by assuming a construction similar to that of each embodiment.

Again in the second and third embodiments, as in the first embodiment, the polarizing plate may be disposed either forwardly or rearwardly of the compound lens and may be omitted in some cases.

In the embodiments described above, KH_2PO_4 crystal having a linear electrooptic effect has been used as the electrooptic crystal, but other linear electrooptic crystals (such as $NH_4H_2PO_4$ crystal) may also be used and further, a crystal having a quadratic electrooptic (Kerr) effect such as $BaTiO_3$ may also be used within the spirit of the present invention.

Also, in the above-described embodiments, both the cemented surfaces of the electrooptic crystals which are cemented together so that their crystal-axis directions differ from each other, and the refracting surface of the lens formed of electrooptic crystal are spherical, but alternatively these surfaces may comprise non-spherical surfaces symmetric with respect to the optical axis. It is also possible to construct a one-dimensional variable-focal-length lens by making said cemented surfaces and refracting surface into cylindrical surfaces.

Further, all the above embodiments have been shown as an example in which the compound lens is constituted by two single lenses at least one of which is formed of electrooptic crystal, but a compound lens may be constructed by combining several single lenses to thereby achieve a shorter focus. Also, the number of electrooptic crystals included in such compound lens may be selected as desired, and it is also possible to enlarge the range of variation of the focal length by providing a plurality of refracting surfaces concerned in the variation of the focal length of the compound lens due to the electrooptic effect.

As described above, the present invention can achieve reduced manufacturing cost and reduced aberrations as compared with the conventional variable focal length lens utilizing the electrooptic effect.

What I claim is:

1. A variable-focal-length lens comprising:

a lens system including at least one set of electrooptic crystals cemented together on curved surfaces thereof so that the directions of their respective axes of rotatory inversion are coincident with each other and so that the directions of their respective two corresponding rotation axes differ from each other;

means for applying an electric field of uniform intensity distribution to said cemented surfaces of said electrooptic crystals so as to make said cemented surfaces refraction surfaces having a lens action; and

means for varying the intensity of the electric field to be applied, to thereby vary the focal length of said lens system.

2. A variable-focal-length lens according to claim **1**, wherein a polarizing plate is disposed on the light path of a light beam passing through said compound lens.

3. A variable-focal-length lens according to claim **1**, wherein said means for applying an electric field comprises parallel flat electrodes attached to said electrooptic crystals.

4. A variable-focal-length lens according to claim **1**, further comprising means provided on the light path of a light beam passing through said compound lens for varying the polarization direction of said light beam.

5. A variable-focal-length lens according to claim **3**, wherein the intensity of the electric field to be applied is varied by controlling the voltage of a variable power source connected to said parallel flat electrodes.

6. A variable-focal-length lens according to claim **4**, wherein said means for varying the polarization direction of said light beam comprises a polarizing plate and means for rotating said polarizing plate about the optical axis.

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